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UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

OFFICE OF RIVER BASIN STUDIES

CLARKS FORK DIVISION
MONTANA AND WYOMING

A PRELIMINARY REPORT ON FISH AND WILDLIFE RESOURCES

BILLINGS, MONTANA

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Missouri River Basin Studies
P. O. Box 1381
Billings, Montana

December 12, 1952

Mr. Kenneth F. Vernon, Regional Director
Bureau of Reclamation, Region 6
Billings, Montana

Dear Mr. Vernon:

Transmitted herewith for your information and files are copies of "A Preliminary Report on Fish and Wildlife Resources in Relation to the Water Development Plan for the Clarks Fork Division, Missouri River Basin Studies, Montana and Wyoming."

Sincerely yours,

Robert W. Burwell
Supervisor

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UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

Billings, Montana

A Preliminary Report on Fish and Wildlife Resources In Relation to the Water Development Plan for the

CLARKS FORK DIVISION

Missouri River Basin Project

Montana and Wyoming

December 1952

For Administrative Use Only

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PREFACE

The Clarks Fork River drains an area of scenic grandeur unsurpassed in the Rocky Mountain Region. The headwaters area contains many marvelous trout streams well stocked with cutthroat, rainbow, and brook trout, and one of the few remaining big-game ranges occupied by moose, elk, mountain sheep, deer, and grizzly and black bears. The wildlife and recreation resources found in this area are of a kind surpassed by none and matched by few, if any, areas in the United States.

This report is a preliminary statement of the general effects on fish and wildlife resources of a development plan under consideration by the Bureau of Reclamation for the Clarks Fork Division of the Missouri River Basin Project. It is based on field investigations, information obtained through interviews with State and Federal personnel and private citizens having knowledge of the area through actual association, and studies of incomplete Bureau of Reclamation preliminary plans available September 1951. Engineering data were supplied by the Region 6 Office of the Bureau of Reclamation, Billings, Montana; the Yellowstone District Office, Billings, Montana; and the Big Horn District Office, Cody, Wyoming. The plans were prepared by the Bureau of Reclamation under the authority of the Act approved December 22, 1944 (58 Stat. 887).

This report was prepared by the Fish and Wildlife Service, Billings, Montana, by authority of the Act of March 10, 1934 (48 Stat. 401) entitled, "An Act to promote the conservation of wildlife, fish and game, and for other purposes," as amended by the Act approved

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August 14, 1946 (60 Stat. 1080, 16 U. S. C. 661).

Valuable assistance in assembling data for this report was received from local residents and personnel of the Wyoming Game and Fish Commission, the Montana Department of Fish and Game, the U. S. Forest Service, and the U. S. Bureau of Reclamation.

DESCRIPTION OF THE PROJECT

1. The Clarks Fork Division, consisting of the drainage basins of the Clarks Fork River and Pryor Creek, and their tributaries, is located in Park County in northwestern Wyoming, and Park, Big Horn, Carbon, and Yellowstone Counties in south-central Montana.

2. Based on investigations and studies to date, the Bureau of Reclamation finds that the best potential use of surface waters in the Division is for hydroelectric power production, and possibly for the irrigation of somewhat more than 1,500 acres in Montana. This report points out the effect that such developments would have on fish and wildlife resources.

3. The present proposals for development in the Clarks Fork Division consist of the Hunter Mountain, Thief Creek, Bald Ridge, and Sunlight Units for firm power and the Whitehorse Bench and Pryor Bench Units for irrigation. Studies are continuing in order to determine the feasibility of providing additional storage and power through development of several natural existing lakes in the basin. The units and lakes under consideration are shown in Table 1.

4. Principal features of the Hunter Mountain Unit would consist of a dam and reservoir on the Clarks Fork River, a tunnel 36,000 feet long, a penstock 2,000 feet long, and a power plant. The reservoir for this unit would be formed by a dam on the Clarks Fork River about 3 miles upstream from the mouth of Squaw Creek. The power plant would be located on the north bank of the Clarks Fork River about 1 mile downstream from the mouth of Crandall Creek.

5. According to present plans, the Thief Creek Unit would consist of a dam and reservoir on the Clarks Fork River, a tunnel 35,000 feet long, a penstock 2,000 feet long, and a power plant. Thief Creek Reservoir would be formed by a dam on the Clarks Fork River about 7 miles downstream from the mouth of Crandall Creek. The power plant would be located on the north bank of the Clarks Fork River just upstream from the mouth of Sunlight Creek.

6. The Bald Ridge Unit would consist of a dam and reservoir on the Clarks Fork River, a canal 3 miles long, a tunnel 4 miles long, a penstock, and a power plant. The reservoir for the Bald Ridge Unit would be formed by a dam on the Clarks Fork River about 1 mile downstream from the mouth of Sunlight Creek.

7. Principal features of the Sunlight Unit would consist of a dam and reservoir on Sunlight Creek, a tunnel 4 miles long, a penstock 8,200 feet long, and a power plant. The reservoir would be formed by a dam on Sunlight Creek about 6.5 miles upstream from the mouth.

8. An alternate dam site for the Sunlight Unit is located about 11.5 miles upstream from the mouth of Sunlight Creek. Additional engineering and economic studies will be made to determine whether the upper or lower site will be included in the final plans for development of the Sunlight Unit. The power plant for the unit would be located on the Clarks Fork River opposite the Thief Creek power plant. More detailed planning may provide for one power plant to serve both Thief Creek and Sunlight Units.

9. The feasibility of obtaining additional storage and power

through utilization of existing natural lakes in the basin is being studied. The following lakes are being considered: Broadwater Lake, about 4 miles northeast of Cooke City, Montana; Fox Lake, about 6 miles east of Cooke City, Montana; Granite Lake, about 5 miles north of Hunter Mountain dam site; Beartooth Lake, about 5 miles northeast of Hunter Mountain dam site; Swamp Lake, about 7 miles west of Thief Creek dam site; and Deep Lake, about 8 miles northeast of Thief Creek dam site.

10. Table 1 presents pertinent available data for the dams and reservoirs which may be included in the plans for development of the Clarks Fork Basin.

Table 1. Pertinent Dam and Reservoir Data - August 27, 1951*

Unit	Purpose	Stream	Height of Dam (feet)	Crest Length (feet)	Reservoir Area (acres)	Reservoir Capacity Acre-feet	Length of Tunnel (feet)	Length of Gravity Conduit (feet)	Length of Penstock (feet)	Power Plant Head (feet)	Power Plant Capacity KW
Hunter Mountain	Power Irrigation Flood Control	Clarks Fork	150	1,480	2,000	150,000	36,000	--	2,000	500	12,000
Thief Creek	Power Irrigation Flood Control	Clarks Fork	260	700	750	130,000	35,000	--	2,000	1,250	60,000
Bald Ridge	Power	Clarks Fork	160	275	55	3,000	21,120	15,840	--	450	30,000
Sunlight (Lower Site)	Power	Sunlight Creek	115	600	1,200	45,000	21,120	--	8,200	1,825	20,000
Sunlight (Upper Site)	Power	Sunlight Creek	160	1,000	872	54,000	--	--	--	2,300	--
Broadwater Lake	Power	Broadwater River	55	970	330	9,300	--	--	9,800	450	1,467
Fox Lake	--	Crazy Cr.	--	--	127	9,300	--	--	--	--	--
Granite Lake	--	Lake Cr.	55	650	--	10,000	--	--	7,000	960	7,050
Beartooth Lake	--	Beartooth Creek	55	760	305	8,500	--	--	31,000	2,700	14,000
Swamp Lake	--	--	60	550	490	18,000	--	--	5,000	421	16,320
Deep Lake	--	Deep Cr.	--	--	--	--	--	--	26,400	2,114	2,430

* Letter to Fish and Wildlife Service, Sept. 11, 1951, from Big Horn District Office, U.S.B.R., Cody, Wyoming

11. The irrigation units which will be considered in connection with the development of the Clarks Fork Division are the Whitehorse Bench and Pryor Bench Units. The Whitehorse Bench Unit consists of approximately 1,500 acres of irrigable land near the confluence of the Yellowstone and Clarks Fork Rivers about 3 miles north of Silesia, Montana. Water for the unit would be obtained by diversion from Rock Creek, a tributary to the Clarks Fork River.

12. The Pryor Bench Unit is located in the Pryor Creek Basin which lies northeast of the Clarks Fork Basin. Pryor Creek, with a drainage area of 616 square miles, is a tributary of the Yellowstone River. The Pryor Bench Unit consists of irrigable lands on the bench east of Pryor Creek, west of Hay Creek, and about 25 miles south of Billings, Montana. The irrigable acreage involved has not been determined at this time. The water supply for the unit would be obtained by diversion from the Clarks Fork River at a point south of Clark, Wyoming. A gravity canal from the diversion would pass through a saddle near Warren, Montana, to the irrigable lands of the unit.

DESCRIPTION OF THE AREA

13. Elevations in the Clarks Fork Basin range from about 13,000 feet in the headwaters area to 3,250 feet at the mouth of the Clarks Fork River. The upper portion of the Basin lies in the Absaroka Range and is characterized by rugged mountains and high plateaus. The lower portion of the basin consists of foothills and rolling plains.

14. The Clarks Fork River rises south of Granite Peak in Montana, flows southeasterly into Wyoming to the confluence of Sunlight Creek and northeasterly into Montana to its confluence with the Yellowstone River near Laurel. In the upper reaches above Clark, Wyoming, the stream and its tributaries occupy deep canyons between high plateaus and mountain peaks. Natural lakes fed by the snowfields and glaciers of the high and rugged Absaroka Range are abundant in the upper portion of the basin. Near Clark, Wyoming, the river enters a valley with broad flood plains bordered by high escarpments and terraces.

15. The Clarks Fork River has a length of 151.5 miles and a drainage area of 2,848 square miles. Principal tributaries are Rock Creek at river mile 18.0 with a drainage area of 561 square miles, Sunlight Creek at river mile 109.6 with a drainage area of 157 square miles, and Crandall Creek at river mile 123 (drainage area not determined). Pertinent river mileage and drainage area data for the basin are presented in Table 2. These data were compiled from the Forest Service map "Custer National Forest (Beartooth Division)," and Corps of Engineers Tables, "River Mileage and Drainage Areas, June 1949."

Table 2. River Mileage Chart, Clarks Fork Basin

Stream and Location	Miles Above Mouth		Drainage Area Square Miles	
Clarks Fork	0.0		2,848	
Rock Creek	18.0	0.0		561
Rockvale, Montana		2.0		555
Source		60.0		0
Edgar, Montana	27.0		2,115	
Fromberg, Montana	37.0		2,004	
Chance, Montana	78.5		1,340	
Near Clark, Wyoming	92.0		986	
Bald Ridge Dam Site	108.6 ±			
Sunlight Creek	109.6	0.0		157
Sunlight Dam Site (Lower)		6.5 ±		
Sunlight Dam Site (Upper)		11.5 ±		
Source		27.2		0
Thief Creek Dam Site	116 ±			
Below Crandall Creek	120.9		451	
Crandall Creek	123 ±			
Hunter Mountain Dam Site	129 ±			
Source	151.5		0	

16. Two important existing water developments in the basin are Cooney Dam and Reservoir and Glacier Lake Dam and Reservoir. Cooney Dam on Red Lodge Creek about 10 miles above its mouth was built in 1936

under the auspices of the Montana Water Conservation Board. This irrigation roservoir has a total capacity of 27,515 acre-feet with a surface area of 862 acres. Glacier Lake Dam at the head of Rock Creek was built in 1937 also under the auspices of the Montana Water Conservation Board. This irrigation reservoir has a capacity of 4,200 acre-feet and a surface area of about 160 acres.

17. Published stream flow records for the Clarks Fork Basin are available at the following locations: Clarks Fork River above Squaw Creek near Painter, Wyoming (12 miles northwest of Painter); Clarks Fork River below Crandall Creek, Wyoming; Clarks Fork River at Chance, Montana (1/2 mile north of the Wyoming-Montana state line); Sunlight Creek near Painter, Wyoming; Rock Creek at Joliet, Montana; and Rock Creek at Rockvale, Montana. Pertinent stream flow data for these streams are presented in Table 3.

Table 3. Stream Flow Data, Clarks Fork Division

Name of Station	Period of Record	Maximum Discharge Second-feet	Date	Minimum Discharge Second-feet	Date	Average Discharge Second-feet	Drainage Area Sq. Miles
Clarks Fork above Squaw Creek near Painter, Wyo.	Oct. 1945-Sept. 1947	2,790	June 20, 1947	Not determined	---	---	144
Clarks Fork below Crandall Creek, Wyoming	1929-1932	6,430	June 25, 1932	Not determined	---	545 (1930-32)	451
Clarks Fork at Chance, Montana	July 1921-Sept. 1947	10,900/a/b	May 26, 1928	48	Jan.16, 1943	883 (1934-47)	1,140
Sunlight Creek near Painter, Wyoming	Aug. 1929-Sept. 1932 July 1945-Sept. 1947	2,110	June 26, 1932	11/a	Jan.17, 1946	115 (1930-32)	139
Rock Creek at Joliet Montana	Dec. 1945-Sept. 1947	1,140	March 20, 1947	58/b	Feb. 18-20, Feb. 24-March 1, 1947	Not Determined	Not determined
Rock Creek at Rockvale, Montana	1920-22 1932-40	2,310	June 8, 1932	0/b	July 14-16, 1935	123 (1935-46)	550

*References
Water Supply Papers, 1077 and 1086, U. S. Geological Survey
/a Observed
/b Daily

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/a Observed
/b Daily

18. The topography of the upper portion of the basin is characterized by deep gorges between glaciated plateaus and mountain peaks (Figs. 1 and 3). The Clarks Fork River has a fall of 1,500 feet in a 6-mile section of the deep gorge which extends from the Beartooth plateau to the valley floor (Fig. 3). The lower portion of the basin is a broad smooth plain of sedimentary deposits. The area has been greatly eroded by streams and warped and faulted by geologic forces so that the land forms include alluvial terraces, badlands, and dry, desert-like depressions.

19. Soils of the valley bottoms are very irregular and vary in texture from clay to sandy loam. Soils of the terraces and benches bordering the stream valleys are also alluvial soils but more mature and uniform than those of the valley bottom. The upland areas are not generally irrigable because of rough topography, shallow soils, or isolated positions with respect to an adequate water supply.

20. The climate is variable over the Clarks Fork Basin. The average annual precipitation varies from 10.42 inches at Bridger, Montana, to 18.66 inches at Crandall Creek. The extremes in temperature range from a maximum of 110° F. at Bridger to a minimum of -49° F. at Crandall Creek. The average growing season in the basin varies from 156 days at Clark, Wyoming, to 65 days at Crandall Creek, Wyoming. A climatic summary for representative stations in the basin is given in Table 4. These data were summarized from the 1941 Yearbook of Agriculture, "Climate and Man," a publication of the United States Department of Agriculture.

Table 4. Climatic Summary, Clarks Fork Basin

Station	County	State	Length of Record Years	Jan. Ave. °F.	July Ave. °F.	Max. °F.	Min. °F.	Average Growing Season Days	Length Of Record Years	Average Annual Prec. Inches
Bridger	Carbon	Mont.	27	21.5	70.0	110	-35	123	29	10.42
Clark	Park	Wyo.	28	25.0	70.5	105	-33	156	30	10.82
Crandall Creek	Park	Wyo.	19	18.2	59.5	94	-49	65	20	18.66

21. Park County, Wyoming, has a population of 15,185 and the city of Cody, Wyoming, a population of 3,866. Carbon County, Montana has a population of 10,106 and the city of Red Lodge, Montana a population of 2,715. Population density for Park County, Wyoming is 2.9 per square mile and for Carbon County, Montana 4.9 per square mile (Preliminary Count 1950).

22. U. S. Highways 12 and 310 and graded county roads serve the basin. The Chicago, Burlington, and Quincy Railroad serves the area. Commercial airline facilities are available at Cody, Wyoming and Billings, Montana.

23. Activities depending on fishing, hunting, and recreation form a principal source of income in the basin. Petroleum production, livestock raising and farming also contribute importantly. Oil refineries are located at Cody, Wyoming.

FISHERY

24. The Clarks Fork River Basin contains two natural divisions: the upper Clarks Fork River and Sunlight Creek, which lie in the mountainous country in Montana and Wyoming from Yellowstone Park to the eastern boundary of the Shoshone National Forest in Wyoming; and the lower Clarks Fork River from the vicinity of Clark, Wyoming, to its confluence with the Yellowstone River east of Laurel, Montana. All the proposed dam sites are in the upper, mountainous portion of the Clarks Fork River Basin. The areas proposed for irrigation lie in the foothills near the mouth of the Clarks Fork River and in Pryor Creek Basin. For clarity the two areas are discussed separately.

Without the Development

Upper Clarks Fork River Basin (Mountainous Area)

25. The upper Clarks Fork River and Sunlight Creek are situated in one of the most scenic mountain areas in the United States. Rugged snowclad mountains with extensive pine and fir forests, mountain meadows, numerous lakes, and deep canyons are characteristic of this region. The country is so spectacular that the Forest Service has set aside the Montana part of the drainage as a portion of the Beartooth Wilderness Area and much of the Wyoming part as the North Absaroka Wilderness Area.

26. Trout weighing up to 3 pounds can be caught in the canyon of the Clarks Fork River; and anglers can easily catch their limit of 8 to 12-inch rainbow, cutthroat, and brook trout along most

of the upper Clarks Fork River and Sunlight Creek, especially in spots away from the main highways. The trout season usually extends from May 1 to October 31 in Park County, Wyoming, and the fishing in these streams remains good throughout most of the season. People from various parts of the nation utilize the excellent stream fishing. The majority of the land in upper Clarks Fork River drainage is public land, by law open to public use, and most of the private land is open to fishing. Posting is not a serious problem. There are five Forest Service camp grounds within the area and natural campsites are abundant throughout the basin.

27. The Clarks Fork River originates in Montana at the outlet of Broadwater Lake, near the northeastern corner of Yellowstone National Park. In its headwaters (Fig. 2), the Clarks Fork River is a clear, cold, mountain stream, which gradually widens as tributaries supplement its flow until it averages about 60 feet in width and 1 to 6 feet in depth near the Montana-Wyoming border. Short falls, rapids, large pools, and water of moderately fast flow are characteristic of the upper reaches of the Clarks Fork River; and it is this portion of the stream lying immediately south of the state line that forms the backbone of an important guest-ranch industry.

28. About 20 miles downstream from its source, immediately below its confluence with Crandall Creek, the Clarks Fork River enters a canyon which deepens into a spectacular gorge that extends for about 12 miles in an easterly direction (Fig. 3). This gorge winds through the timbered slopes and high meadows of the basin until it terminates

abruptly near the boundary of the Shoshone National Forest. The 7 miles of river from Thief Creek to Sunlight Creek within this canyon have a steep gradient of nearly 200 feet per mile. This is a spectacular reach of river with nearly 50 percent of its course composed of white-water rapids.

29. Sunlight Creek (Fig. 4), a clear-water tributary of the Clarks Fork River, averages about 30 feet in width and offers fish habitat and trout fishing similar to that found in the Clarks Fork River above the canyon. This creek also forms the basis of an important outdoor recreational area as is revealed by the guest ranches which lie along its course.

30. Many resident and non-resident fishermen use the upper Clarks Fork River and Sunlight Creek. In comparison to other streams, these waters attract a large number of non-resident or tourist anglers who travel great distances specifically to fish and the demand is increasing. Fishing license sales in Park County, Wyoming have increased from about 2,500 in the year 1929 to over 4,000 in 1939 and to nearly 11,000 in 1949; and it is believed reasonable to expect a continued increase in usage of this area. (1)

31. Of 74 tributary streams to the upper Clarks Fork River in Wyoming, only one-third to one-half of this number are considered suitable for trout. Most of the tributaries are small, precipitous,

(1) Wyoming Game and Fish Commission Biennial Reports, 1929-1930, 1939-1940, and Annual Report, 1949.

boulder-strewn creeks. The most important tributary creeks for stream fishing are Sunlight, Crandall, Dead Indian, and Squaw Creeks. Sunlight and Crandall Creeks average approximately 30 feet in width; and Dead Indian and Squaw Creeks average 20 feet or less in width.

32. Several lakes in the upper basin of the Clarks Fork River are being considered for water-use development; they are: Beartooth, Broadwater, Fox, Swamp, Deep, and Granite Lakes. These high mountain lakes of the Clarks Fork River Basin are generally characterized by great natural beauty, precipitous bluffs, timbered shore lines, clear water, and good production of several species of trout. Although some of these lakes are not being utilized to the fullest extent at present, and others are relatively untouched, the ever-increasing demand for outdoor recreation in the mountain wilderness areas places a great potential worth on each of them. Since 1946, utilization of these lakes has increased greatly. This is evidenced by the increased number of guided pack trips into the area, the development of new guide services and tourist facilities, and the increase in license sales. As the accessible, roadside waters are becoming more heavily fished, more and more anglers are seeking the "back-country" lakes. Limit catches of trout can be taken from many of these lakes by most anglers, and some of the waters produce fish weighing up to 5 pounds. Those fishermen who secure access to lakes off the road usually do so at great expense or at considerable personal effort in hiking into the areas.

33. Beartooth Lake has been intensively developed for recreational use and has high fishery value. Brook trout are taken

there in large numbers. Permanent campgrounds have been established near the lake's outlet on U. S. Highway No. 12. Summer homes and cabins are distributed along the east shore of the lake, and tourist facilities are available. Fishing pressure by non-resident as well as resident anglers is heavy and the scenic beauty of the area enhances its attractiveness to the fisherman.

34. Broadwater Lake (Fig. 5) is in reality comprised of two lakes, which are joined by a narrow channel approximately 200 yards in length. Although both lakes produce excellent fishing for cutthroat and brook trout, the upper lake is probably the more scenic of the two. Timbered shores, small islands, inlets and bays, and clear water characterize these lakes. These areas are within hiking distance of Kersey Lake campground, a Forest Service facility. The outlet of lower Broadwater Lake also offers some fishing for smaller fish and is noted for its scenic qualities. From the evidence on hand, the Broadwater Lakes are potentially among the most important recreational waters for fishermen in this region.

35. Fox Lake, in the Crazy Lake chain, also is characterized by great natural beauty. High bluffs mark the shore line. The water is clear and blue, and anglers have no difficulty in consistently taking fairly large rainbow trout. Access to the area at present is by foot or horse. Crazy Creek, which drains from the Crazy Lake chain, also offers some fishing for small trout ranging in length from 6 to 10 inches. The country in general is very appealing to anglers.

36. Granite Lake is another high-altitude body of water, quite similar to the preceding lakes, except that it is larger and a little more inaccessible. Rainbow trout can be caught from this lake with little trouble. Brook trout are present. Granite Lake is surpassed by none of the other lakes in natural beauty. It is the headwater source of Lake Creek (Fig. 6), a precipitous mountain stream characterized by numerous backwaters and cutoffs, which offer good fishing for small trout.

37. Swamp Lake, unlike the lakes previously described, lies at a much lower altitude near the Clarks Fork River. It is characterized by dense grass, rushes, and emergent aquatic plants around its shores. High bluffs form part of the shore line, and a large guest ranch is located on its shore. Brook trout weighing over 2 pounds frequently are taken from its waters.

38. Deep Lake is located at an altitude comparable to Swamp Lake. Although a jeep trail enters part way into the lake from U. S. Highway 12, the lake at present is inaccessible to anyone but horsemen and hikers. The shore line is characterized by precipitous bluffs and steep slopes. The scenic grandeur of the lake and the excellent catches of brook, cutthroat, and rainbow trout which are taken from its waters amply reward the fishermen who make the long trip into its shores (Fig. 7). Little Rock Creek, which drains from Deep Lake, also offers some trout fishing to those who are willing to hike its course.

39. Beartooth Lake, which is readily accessible, undoubtedly now possesses the greatest monetary value of any of these waters. Swamp

Lake also has been developed for recreation and definitely has high monetary value at present. On the other hand, all of these lakes possess a high potential value, particularly the Broadwater and Fox Lakes. Granite Lake, which is the most inaccessible of these waters, probably would not be utilized as heavily in the near future as the other lakes, but nevertheless it too possesses an important potential value.

Lower Clarks Fork River Basin (Foothills Area)

40. The Clarks Fork River, outside of the mountains and Clarks Fork Canyon, flows northeastward through near-desert, sagebrush country in Wyoming, and irrigated lands in Montana, where gumbo soils, silt-laden tributaries, and irrigation return flows increase the turbidity to the point where the river is almost perpetually muddy. The lower Clarks Fork River has a low fishery value compared to the upper reaches of the river. Burbot and mountain whitefish become more important to the fishery of this portion of the stream; and although considerable numbers of trout are taken from the reach of river which lies above Bridger, Montana, good fishing by Montana standards does not exist in the river below Bridger. Carp and suckers become common near the mouth of the stream.

41. Two tributaries of the lower Clarks Fork River have fishery value. These streams are Blue Water and Rock Creeks. Blue Water Creek has a limited trout fishery in some spring-fed sections of the creek. A state trout-rearing station recently has been established

on this stream east of Fromberg, Montana. Rock Creek is an important fishing stream for rainbow and brown trout and is fished heavily by anglers from towns lying up to 100 miles east of its mouth. Cooney Reservoir is the only extensive impoundment in the area and is located on Red Lodge Creek, a small tributary to Rock Creek. Fishing in Cooney Reservoir is mediocre; suckers, carp, and trout (rainbow and some cutthroat) are caught by fishermen. In addition, flows below Cooney Reservoir during periods of irrigation releases are so turbid as to contribute to unsatisfactory conditions for the maintenance of a fishery on lower Rock Creek below the mouth of Red Lodge Creek. Coarse species such as suckers are abundant and the yield of trout is reduced in this lower section of Rock Creek throughout much of the summer.

42. The portion of Pryor Creek which lies within the area of influence of the Pryor Bench lands does not maintain a fishery of significant value.

With the Development

Upper Clarks Fork River Basin (Mountainous Area)

43. With the developments, the most valuable stretch of Clarks Fork River from Cooke City, Montana, to Bald Ridge dam site would be radically changed. The construction of the Hunter Mountain and Thief Creek dams would inundate about 18 miles of the most valuable stream fishery in Clarks Fork River, and 4 miles of trout stream would be inundated with the construction of either Upper or Lower Sunlight Reservoirs on Sunlight Creek. It is believed that the reservoir fishery

at Sunlight and Hunter Mountain sites would not replace all the original stream fishery values even though trout production might be relatively good. The fluctuation in the reservoirs would be likely to make access to the shore line difficult to fishermen. The deep canyon site of Thief Creek Reservoir would be likely to preclude extensive utilization of the reservoir by anglers. In addition, the primitive, unspoiled nature of the land and the rivers would be replaced by reservoirs that would not appeal to many of the fishermen who travel to this area specifically to fish in streams.

44. Bald Ridge Reservoir also would be somewhat difficult of access in its deep canyon site. However, the area is inaccessible at present and the reservoir would show a gain in fishery values over river conditions without development if a safe convenient means of access were provided for public use.

45. The proposed tunnels and penstocks for Hunter Mountain, Thief Creek, Bald Ridge, and Sunlight Units are expected to reduce considerably the natural stream flows of about 20 miles of stream. A total of about 46 miles of Clarks Fork River and Sunlight Creek above the Bald Ridge dam site would be affected by construction and operation of the proposed reservoirs. Primitive attributes of these waters would be lost entirely and a large portion of the affected reaches of these streams probably would incur fishery losses.

46. Tributaries of the upper Clarks Fork River, other than Sunlight Creek and possibly Crandall Creek, would be unaffected by the development except for those creeks which flow out of the presently

existing lakes on which dams are proposed. The latter would incur fishery losses if releases from the impounded lakes were not adequate to maintain existing fish populations.

47. The headwater fishery of Clarks Fork River near Cooke City and above Hunter Mountain Reservoir site also may be adversely affected by the proposed developments if stream flows adequate to the maintenance of the existing fishery are reduced as a result of water development on headwater lakes, particularly the Broadwater Lakes.

48. The proposed dams for Broadwater, Fox, Granite, Beartooth, Deep, and Swamp Lakes may be expected to increase the surface acreage of the lakes; the fluctuating level of the water would, however, decrease the esthetic value and destroy the original shore line. These lakes would then be less attractive to fishermen than lakes which are in their natural condition. It is possible that water from Lower Crandall Creek may be diverted into Swamp Lake. If much water is diverted, Crandall Creek would be proportionately reduced in fishery value. The dams would also decrease the available spawning waters, since in these lakes trout apparently spawn in the outlet streams (which would be cut off by the dams) as well as the inlet streams.

49. The greatest losses on the lakes would occur at Beartooth, Broadwater, Swamp, Fox, Deep, and Granite Lakes in the order listed. There would be significant losses in all cases.

Lower Clarks Fork River Basin (Foothills Area)

50. Decreased stream flows below Bald Ridge dam site would reduce the value of the fishery in the lower Clarks Fork River. If

adequate flows were maintained, however, the fishery of the lower Clarks Fork River might remain essentially unchanged.

51. Rock Creek is the only tributary on the lower Clarks Fork River which would be likely to show a significant fishery loss as a result of water-use development. Heavy fishing pressure and good production on the upper portion of this creek above the mouth of Red Lodge Creek makes this a valuable trout stream. In event that developments are contemplated for Rock Creek, further dewatering of the stream, particularly above the mouth of Red Lodge Creek, would reduce drastically its fishery values.

52. Development of irrigation on Pryor Bench would not be expected to affect the insignificant fishery of Pryor Creek.

WILDLIFE

Ecology and Cover Types

Mountainous Area

53. Over one-half of the upper drainage of the Clarks Fork River is within the bounds of two wilderness areas, the Beartooth in Montana and the North Absaroka in Wyoming. As indicated previously, elevations vary from less than 6,000 feet to over 12,000 feet. Four ecological life zones occur within this area. The two most prominent ones are the Canadian Zone, with large stands of lodgepole pine and Douglas fir, and the Hudsonian Zone, timbered with white-bark and limber pines, Englemann spruce, and alpine fir. Small areas of the Arctic-Alpine Zone are present where higher mountains and plateaus extend above the timber line. The Transition Zone is found in the stream valleys from lower Sunlight Creek downstream to where the Clarks Fork River leaves the mountains.

54. Willows are found along the Clarks Fork River valley and up the various tributaries wherever flood plains are present. Grassy meadows are interspersed with aspen and coniferous trees on the slopes along the streams in all but the most precipitous canyons. The grasses, willows, and aspens have been overutilized by livestock in much of the Clarks Fork River valley and Sunlight Basin. Marshy areas are present near most of the lakes which may be impounded. Swamp Lake has the most notable area of marshland, presenting large plots of marsh grasses, sedges, rushes, and cattails interspersed

with open water and spruce and willow-covered islands and peninsulas (Fig. 8). Some irrigation occurs on the Hunter Mountain and Lower Sunlight sites. Crops are all wild and tame hays with the exception of a small acreage of oats on the Lower Sunlight site.

Irrigable Areas

55. The two irrigable areas in Montana are within the upper Sonoran Life Zone and are extensively dry-farmed with wheat being the principal crop. The Pryor Bench appears to be almost 100 percent block-farmed in wheat and fallow land. About 95 percent of the Whitehorse Bench is strip-farmed with dryland wheat (Fig. 9). The remaining 5 percent of this latter area is range land with a cover of sagebrush, cactus, and native grasses.

Without the Development

Mountainous Area

56. Big Game. Big-game populations are important in the upper Clarks Fork River drainage. In fact, the Clarks Fork Division is located within one of the best natural big-game regions of the United States. Rocky Mountain bighorns, moose, elk, black and grizzly bears, and mule deer are found within the area. Places where such a variety of big-game animals may be seen or hunted are becoming rare while the demand for such areas is rapidly increasing. Bighorns and moose, which may be hunted within the Clarks Fork Division, are two very important big-game species that are now non-existent in most of the United States.

57. Wyoming is the only state in which bighorn hunting is allowed annually. Of the 85 hunting permits allowed for 1950 in the entire state, 10 were issued for the Clarks Fork Division in the project area. Applications far outnumber the available permits even though the costs of permits and the hunting are high. The mountain sheep also have special historical importance in the area. A group of Indians called "Sheepeaters" is said to have been the first inhabitants of this drainage. They derived the name through the practice of hunting bighorns extensively for food. The present mountain-sheep herds are not found in the immediate vicinity of the proposed reservoir sites. However, as these herds increase it can be expected that they will use much of the habitat in the reservoir areas since such areas are excellent for these animals.

58. The moose population of the upper Clarks Fork River drainage is of national importance. Only six states in the nation had moose populations of over 100 animals in 1948. Wyoming had the greatest population with some 3,200 of a total national population of 11,700 moose. Of 336 moose killed in the United States that year, 214 were taken in Wyoming. (2)

59. The best moose habitat is found in regions where wilderness conditions prevail, and such areas are scarce indeed. Moose are dependent upon areas in which deep forests, willow flats, lake margins, and stream bottoms are found. The forest offers protection from the

(2) Big-Game Inventory of the United States, 1948. Wildlife Leaflet 321; Fish and Wildlife Service, U. S. Dept. of Interior, March 1950.

hot sun of summer and the cold winds of winter, while the aquatic and border plants of lake margins and stream bottoms provide the necessary food during all seasons. All the required conditions for good moose habitat are present in varying degrees throughout the upper Clarks Fork River drainage. With the exception of Bald Ridge, all of the proposed reservoir sites and the margins of each of the six lakes for which impoundment is being considered are moose habitat. The Hunter Mountain (Fig. 10), Upper and Lower Sunlight, and Swamp Lake sites have a total population of about 75 moose. Several live on, or in the vicinity of, each of the other sites under consideration.

60. Two large bogs on Muddy Creek between U. S. Highway No. 12 and Granite Lake offer valuable year-round feeding grounds to moose, elk, and deer. These areas are of particular value to these species during early winter.

61. Elk are important big-game animals in the area and, like moose, use the habitat of most of the reservoir sites. Sunlight Basin, within which the Upper and Lower Sunlight Reservoir sites are located, is an important wintering area for elk. Approximately 1,000 of these animals winter here. Because of competition between elk and livestock, this number represents about the maximum carrying capacity of the range. Elk also use available habitat at Swamp Lake and the upper end and bordering rims of the Thief Creek Reservoir site (Fig. 11).

62. Black bears are common in the reservoir areas of the Clarks Fork River, and grizzly bears occur in small numbers. Eleven bears were taken in 1950 and eight were killed out of one camp in the

spring season of 1951. Three of the latter were grizzly bears. Although bears are not directly dependent upon the habitat of any of the proposed sites, their well-being is dependent on wilderness conditions.

63. Mule deer are found throughout the entire upper Clarks Fork River drainage in varying numbers and make use of all the proposed development sites involved. The best deer areas are found in Sunlight Basin where many deer congregate during the winter months.

64. Upland Game, Fur Animals, and Waterfowl. The mountainous area of the Clarks Fork Division is mainly important as a big-game country, but other wildlife groups are also found. Upland-game animals present in the area are snowshoe rabbits, ruffed and blue grouse. Beavers, minks, martens, otters, red foxes, badgers, coyotes, weasels, and muskrats are the fur animals of the area. The fur animals formerly had a more important status than at present. The search for fur animals has been credited with being the reason for white men first exploring and settling the region in the early part of the nineteenth century. A few ducks and Canada geese nest near various high-altitude lakes within the upper Clarks Fork River drainage. However, this use is extremely slight. The area is not suitably located to be of significance as a resting stop for migrating waterfowl.

Irrigable Areas

65. Wildlife Species. There are a few upland-game birds on the areas proposed for irrigation. The Whitehorse and Pryor Bench

Units support small numbers of sharp-tailed grouse and a few Hungarian partridges. The Pryor Bench Unit also supports a small sage-grouse population. The only fur animals occurring in more than trivial numbers on the irrigable areas are jack rabbits. No important waterfowl use is made of any of the lands.

Management and Special Areas

66. The State of Wyoming maintains one closed area for elk and deer within the upper Clarks Fork River drainage. This area serves as a buffer strip along the Montana-Wyoming state line and deters Montana hunters from hunting in Wyoming and vice versa. The closed area also serves to protect a herd of about 200 elk which migrates across the Red Lodge-Cooke City Highway between the area around Clay Butte and the area near the Clarks Fork River below Crandall Ranger Station. The Hunter Mountain, Beartooth Lake, and Granite Lake Reservoir sites are within this Clarks Fork Closed Area.

67. Two wilderness areas which have been set aside by the U. S. Forest Service extend into the upper Clarks Fork River drainage. The Beartooth Wilderness Area in Montana contains two of the lakes which are under consideration for development, namely Broadwater and Fox Lakes. None of the presently proposed reservoirs would actually be within the confines of the North Absaroka Wilderness Area in Wyoming. The Hunter Mountain, Swamp Lake, and Upper Sunlight Reservoirs would be very close to its border, however.

With the Development

Mountainous Area

68. Big Game. The big-game populations within the drainage would be adversely affected in varying degrees by development of the 11 proposed reservoirs. Mountain sheep and black and grizzly bear habitat would not be destroyed directly, but the suitability of the area as a whole for these animals would be lessened through changes in natural features and human invasion of several remote locations, that would occur during construction and later during maintenance and operation. The "back-country" lakes of the Upper Clarks Fork Basin lie in the midst of one of the most primitive big-game habitats in the west. Any water-use development of these natural lakes would result in a loss of wild attributes of the country and a reduction in value of big-game resources.

69. Actual destruction of deer habitat would take place with construction of any or all of the developments in the drainage. Deer populations are not in excess of available habitat within the drainage, with the possible exception of Sunlight Basin, and little reduction in total numbers would be expected with the developments. However, if the proposed developments are constructed, any possibility of a significant future increase in deer numbers would be lost.

70. Very important losses would occur through destruction of moose habitat. Since the area of moose habitat is limited and most of that available in the upper Clarks Fork River drainage is utilized,

destruction of habitable areas would cause comparable losses in moose numbers. With the exception of the Bald Ridge site, every prospective reservoir in the drainage would inundate some good moose habitat. The large bogs on Muddy Creek between U. S. Highway No. 12 and Granite Lake should not be disturbed either by water-level manipulation or by construction of routes of access to Granite Lake through the Muddy Creek valley. All of this terrain is valuable moose habitat. The total area that would be flooded by Hunter Mountain, Swamp Lake, and either of the Sunlight Reservoir sites, supports an important part of the total moose population of the entire drainage and, when added to the areas which would be destroyed by the other proposed developments, would cause big-game losses which could never be replaced.

71. Any water development affecting elk habitat is also important. A considerable amount of winter habitat for this species would be lost if Swamp Lake, Thief Creek, and either Upper or Lower Sunlight Reservoirs were constructed. The grass and low browse available in these areas are used extensively by elk during the winter months. Due to the rugged character and severe climate of this region, the amount of winter range limits the carrying capacity of the drainage. The loss of any land which would support elk during the winter season would result in a decrease in resident elk populations.

72. The Sunlight Basin, within which the Upper and Lower Sunlight Reservoir sites are located, is considered the most important wintering area for elk within the upper Clarks Fork River drainage. Much livestock use of the range near and within the Lower Sunlight

Reservoir site has resulted in serious overutilization of available forage (Fig. 12). Because of heavy livestock use, the forage available in the vicinity of the Lower Sunlight site is lower in value than that found in and near the upper site (Fig. 4). It would be less injurious to the Sunlight Basin elk herd if the lower reservoir were constructed and the upper site left in its present condition.

73. Upland Game, Fur Animals, and Waterfowl. The developments in the mountainous portion of the Clarks Fork Division would have little effect on upland game in the upper drainage. Impoundment of natural lakes would be injurious to nesting waterfowl and some aquatic fur animals. Additional moderately adverse effects on aquatic fur animals would be caused by loss of natural stream conditions in the main river valley.

Irrigable Areas

74. Wildlife Species. Sage-grouse habitat available on the lands under consideration would be lost through irrigation developments. Some pheasant and aquatic fur-animal habitat would be created by water development on the irrigable areas. The irrigated areas should have some value as waterfowl nesting habitat and ducks and geese may utilize waste grains on each of the areas during migration periods.

Management and Special Areas

75. Some big-game habitat would be lost in the Clarks Fork Closed Area as a result of the raising of Beartooth and Granite Lakes and the completion of Hunter Mountain Reservoir.

76. The Beartooth Wilderness Area necessarily would be violated by the building of roads into Broadwater and Fox Lakes, should dams be erected there. Although none of the potential developments fall within the North Absaroka Wilderness Area, their close proximity would add nothing to the recreational and esthetic values of the general district and, conceivably, might detract therefrom.

DISCUSSION

77. It is believed that each of the proposed reservoirs in the Upper Clarks Fork River drainage would have an injurious effect on wildlife. It also appears that most of the proposed reservoirs would be deleterious to the existing fishery; and, if these reservoirs are constructed, extensive fishery developments would be required in order to realize potential fishery values which might occur.

78. The most effective means of preventing damages to the fish and wildlife resources of the Clarks Fork Basin would be through limiting dam construction to only those sites where necessity demands immediate development. On Sunlight Creek and the Clarks Fork River, the greatest damages to fish and wildlife would occur as a result of development at (1) Upper Sunlight, (2) Lower Sunlight, (3) Hunter Mountain, and (4) Thief Creek Reservoir sites in the order listed. On the offstream lakes, greatest damages would occur to fish and wildlife at (1) Beartooth, (2) Broadwater, (3) Fox, (4) Swamp, (5) Deep, and (6) Granite Reservoir sites, in the order listed.

79. The Bald Ridge Dam would create the only reservoir which would be likely to show fishery benefits without causing a loss in the quality of the fishery resources of the basin. In addition, operations of Bald Ridge, Hunter Mountain, Sunlight, and Thief Creek Reservoirs would need to be such that fluctuations would be at a minimum, particularly during the months of June, July, and August if potential reservoir fishery values are to be obtained.

80. It also would be necessary to maintain adequate stream flows below all the reservoirs on the Clarks Fork River and Sunlight Creek in order to preserve downstream fishery values. Minimum flows required to maintain the existing fishery below each dam site on these streams are estimated in Table 5.

Table 5. Stream-flow Requirements in Second-feet

Duration of Flow	Hunter Mountain	Upper Sunlight	Lower Sunlight	Thief Creek	Bald Ridge
Nov. 1 to April 15	45	35	15	100	200
Apr. 16 to July 31	200	120	90	350	450
Aug. 1 to Aug. 31	100	80	50	250	300
Sept. 1 to Oct. 31	70	50	30	200	250

81. The construction of any of the proposed high dams on natural lakes in this area would be particularly detrimental to the fishery. Dams which would raise lake levels more than 10 feet would do much more damage than low-level impoundments. High dams on these lakes would be likely to result in wide fluctuation in water level and fishery losses would be correspondingly increased.

82. The outlet streams of all these natural lakes would be reduced in fishery value if stream flows were reduced below the necessary minimum to maintain existing fisheries. Impoundment of Broadwater Lake would be particularly significant in this respect due to possible dewatering effects on the upper reaches of the Clarks Fork River above the headwaters of Hunter Mountain Reservoir.

83. Maximum fishery returns from the reservoirs on the Clarks Fork River and Sunlight Creek might be realized if a good road were built and maintained between U. S. Highway No. 12 and all reservoir sites. In addition, it would be desirable to establish boat liveries and safe access routes, conveniently located, for the launching of small craft on all proposed reservoirs on Clarks Fork River and Sunlight Creek. Safe convenient means of access would be of particular importance on Bald Ridge and Thief Creek Reservoirs. However, it should be pointed out that these proposed developments would not completely offset the losses involved.

84. The mountainous area of the Clarks Fork is an excellent big-game country and compares favorably with the best in the nation. Construction of water-use developments considered in this report would result in irreparable losses to big-game populations. Any and all reductions that can be made in developments for the area are very important and necessary if this region is to retain a portion of its present worth.

85. The Sunlight Basin is an especially good wintering area for big game. Since the range within the lower site is of less value to wintering big game than that found in the upper site, construction of the Lower Sunlight Reservoir would cause a smaller loss to elk and deer than would development farther up the valley.

86. Some improvement of forage conditions could be effected on the slopes and valley bottom near the lower site during and after development of that site. Any substantial reduction in the intensity

of livestock use on these lands would make winter range of better quality available for elk and deer.

87. Most of the deeded lands in the area would be either inundated or isolated by water through construction of Lower Sunlight Reservoir. The entire basin and its surrounding slopes would be relieved of much livestock pressure if all the private lands in the area were purchased. at the time procurement was made of reservoir lands and livestock grazing permits on surrounding lands were substantially reduced or entirely cancelled. If these surrounding private lands were then maintained specifically as a winter range for elk and deer, the improved quality of forage on these lands could mitigate much of the loss caused by inundation of the valley bottom lands within the reservoir.

88. It has been mentioned previously that the amount of winter range limits the size of the elk herd which can be maintained in this section of the country. Summer range on the higher mountain slopes is extensive and is seldom fully utilized by game anywhere in the northern Rocky Mountain Region. Elk require the same general type of range during the winter months that is utilized by grazing livestock, and conflicts between livestock interests and wildlife interests have arisen in most areas where elk have flourished. The outcome of such conflicts usually has been detrimental to elk and herds have often been seriously reduced in numbers. If reservoirs within the Clarks Fork Division are to complicate further an already serious situation, losses might be great indeed.

RECOMMENDATIONS

89. It is recommended that:

(1) No water-use development be made in the mountainous portion of Clarks Fork Division.

(2) If some developments must be made, the following proposals be adopted:

(A) Consideration be given to the possibilities of not constructing reservoirs on those sites which have been listed herein as being most valuable to fish and wildlife.

(B) Minimum flows as listed in the following table be maintained on the Clarks Fork River and Sunlight Creek.

Table 6. Stream-flow Requirements in Second-feet

Duration of flow	Hunter Mt.	Upper Sunlight	Lower Sunlight	Thief Creek	Bald Ridge
11-1 to 4-15	45	35	15	100	200
4-16 to 7-31	200	120	90	350	450
8-1 to 8-31	100	80	50	250	300
9-1 to 10-31	70	50	30	200	250

(C) Flows adequate to maintain the downstream fishery be included in the operational plans for all other dams.

(D) Fluctuations be held to a minimum in all reservoirs and impounded lakes, particularly during the months of June, July, and August.

(E) Dams constructed on natural lakes not raise water levels more than 10 feet above historical mean.

(F) All water conduits capable of transporting fish be adequately screened.

(G) An all-weather road be constructed and maintained between U. S. Highway No. 12 and reservoirs constructed on the Clarks Fork River and Sunlight Creek.

(H) Provision be made for the establishment of boat liveries on all reservoirs on Sunlight Creek and Clarks Fork River.

(I) Facilities be provided for the launching of small craft on all reservoirs on Sunlight Creek and Clarks Fork River.

(J) If power developments are made on Sunlight Creek, that the Lower Sunlight site be chosen rather than the upper site.

(K) If the Lower Sunlight site is developed, deeded lands within the basin adjacent to the reservoir site be purchased and transferred to the State for game management, and accompanying forest grazing

permits be cancelled or reduced where possible to mitigate losses of winter range inundated by the reservoir.

(L) The large bogs on Muddy Creek between U. S. Highway No. 12 and Granite Lake not be disturbed either by water-level manipulation or construction of routes of access through the Muddy Creek Valley.

CONCLUSIONS

90. Construction of the proposed reservoirs and attendant features in the mountainous back country of the upper Clarks Fork River would constitute an invasion of one of the nation's most spectacular unspoiled forest areas. A series of dams in this area would do irreparable damage to the fish, wildlife, and recreational values of the region.

Fish

91. The Bald Ridge Dam would impound the only reservoir which would be likely to show fishery benefits without causing a loss in the quality of the fishery resource of the basin. And even this reservoir is likely to reduce fishery values of the stream below if adequate flows cannot be maintained downstream.

92. The upper Clarks Fork River Basin provides high-quality sport fishing under attractive wilderness conditions. Areas of this kind are becoming increasingly rare in the United States. Once lost, or seriously impaired, little can be done to compensate.

93. Within certain limits, fishery losses can be mitigated in the Clarks Fork River Basin by the adoption of proposals A through H.

Wildlife

94. The power developments proposed in the upper Clarks Fork River drainage would cause a major depletion in the big-game herds inhabiting the mountainous region of the basin.

95. Moose populations would suffer the most serious loss from the development planned in the upper Clarks Fork River drainage. The reduction in numbers of this largest remaining big-game animal in the United States would be of national importance.

96. If proposals J, K, and L were followed, losses to wildlife in the upper Clarks Fork River drainage would be reduced substantially.

APPROVED:

Robert W. Burwell, Supervisor
Missouri River Basin Studies

December 12, 1952

MRBS 4104

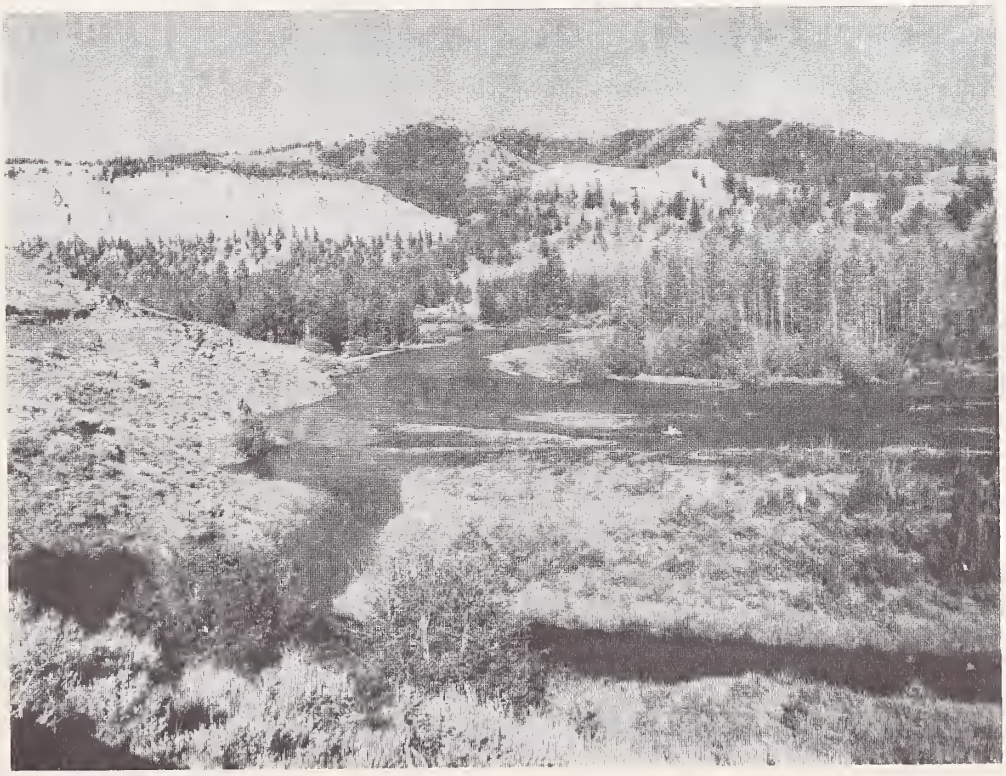
Fig. 1. Sunlight Basin from top of Dead Indian Hill. Lower Sunlight dam site is located at white slide area in upper left center of picture. August 1950. (Photographed by H. M. Borges.)

MRBS 3641

Fig. 2. Clarks Fork River at Hunter Mountain dam site. July 25, 1951. (Photographed by H. M. Borges)

MRBS 3282

Fig. 3. Clarks Fork Canyon near Thief Creek power site. January 1951 (Photographed by J. N. Brown)



MRBS 3642

Fig. 4. Sunlight Creek near the head of the upper reservoir site. Note timber and meadows. July 1951. (Photographed by H. M. Borges)

MRBS 4105

Fig. 5. Broadwater Lake illustrating typical mountain lake subject to prospective development. August 1951. (Photographed by H. M. Borges)

MRBS 4106

Fig. 6. Lake Creek, the outlet from Granite Lake High in the Absaroka Range. August 1951. (Photographed by H. M. Borges)

MRBS 3714

Fig. 7. Cutthroat and brook trout taken from Deep Lake. June 1949. (Photographed by L. A. Peterson)

MRBS 3604

Fig. 8. Swamp Lake. Good Habitat for waterfowl, aquatic fur animals, and moose. July 1951. (Photographed by Wilfred D. Crabb)

MRBS 3630

Fig. 9. Whitehorse Bench Area showing present utilization, mostly strip-farmed wheat. July 1951. (Photographed by Wilfred D. Crabb)

MRBS 3577 & 3578

Fig. 10. Hunter Mountain Reservoir Site from middle of site toward upper end showing meadows and woody cover. July 1951. (Photographed by Wilfred D. Crabb)

MRBS 2937

Fig. 11. Upper end of the Thief Creek Reservoir area, wintering area for elk. July 1950. (Photographed by E. J. Connolly)

MRBS 3605 & 3606

Fig. 12. Lower Sunlight Reservoir Site showing valley and surrounding slopes used by elk in winter and horses during the summer. July 1951. (Photographed by Wilfred D. Crabb)

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
MISSOURI RIVER BASIN STUDIES
PRELIMINARY
LOCATION MAP

CLARKS FORK DIVISION
MONTANA AND WYOMING

DRAWN MEE	SUBMITTED
TRACED MEE	RECOMMENDED
CHECKED	APPROVED

BILLINGS, MONTANA DEC 1951 | MO 2-2-1